

the claimed invention from the prior art, specifically the walls of the Wiemer patent which separate adjacent passages. Each wall of the Wiemer patent has a width that becomes progressively wider, as shown in Fig. 2.

As stated during the interview, the passages of the Wiemer patent do not become progressively wider on a cross-sectional surface or plane, from an inner end to an outer end thereof, as shown in Fig. 2. On a cross-sectional plane, which includes the circumference of the end plate, the passages have a general uniform thickness. Unlike the passages of the Wiemer patent, each channel of Applicants' claimed invention becomes progressively wider along a plane which includes the circumference of the corresponding end chamber between the narrower end and the wider end thereof. Further, the walls which separate the adjacent channels of Applicants' claimed invention have a uniform thickness.

Although no agreement was reached during the interview regarding independent Claims 1 and 14, it was generally understood that Applicants would amend these independent claims to better emphasize the differences between Applicants' claimed invention and the Wiemer patent. Accordingly, Claims 1 and 14 have been amended as discussed below. Since the Examiner agreed that amended Claim 20, as proposed, distinguishes Applicants' claimed invention from the prior art, amended Claim 20 as proposed during the interview has not been subsequently revised.

Amendment to the Claims

Applicants have generally amended Claims 1-12, 14, 20 and 21 to clarify the claim language and to consistently name the elements.

Applicants have amended independent Claims 1 and 14 to indicate that each channel becomes progressively wider along a plane which includes a circumference of the corresponding end chamber. Support for this amendment is found in the specification at page 11, lines 14-17, wherein it is taught that each channel has a wider end approaching the inner shell and annulus, and a narrower end closer to the journal. Further support for this amendment is found in Fig. 1, wherein it is shown that each channel becomes progressively wider from the narrower end to the wider end at the circumference of the end chamber. Further, independent Claim 14 has been amended to require a roller journal in communication with the inlet end chamber.

Applicants have amended independent Claim 20 to indicate that the adjacent inlet channels are separated by a wall having a substantially uniform thickness. Support for this amendment is found in the specification at page 12, lines 14-16, wherein it is taught that the walls separating the adjacent inlet channels do not increase in thickness between the narrower end near the journal and the wider end near the annulus. Further support for this amendment is found in Fig. 1.

Applicants urge that the above Preliminary Amendment introduces no new matter into this patent application.

Claim Rejections - 35 U.S.C. §102

The rejection of Claims 1, 8 and 20 under 35 U.S.C. §102(b) as being anticipated by Wiemer, German Patent Reference 587,808, is respectfully traversed.

The Wiemer patent does not disclose a plurality of inlet channels which become progressively wider along a plane which includes a circumference of the inlet end chamber, as claimed in amended Claim 1. Nor does the Wiemer patent disclose a wall having a substantially uniform thickness separating adjacent inlet channels. The Wiemer patent discloses in Fig. 2 a plurality of radially extending passages having a uniform width along a plane which includes the circumference of the end plate. The adjacent passages of the Wiemer patent are separated by walls (2) which progressively become wider from an inner end portion to an outer end portion.

As a result of the passages in the Wiemer patent having a uniform width along a plane which includes the circumference of the corresponding end plate and the walls which separate adjacent passages having a non-uniform thickness, the heat transfer fluid is not evenly distributed to the annulus and around the circumference of the inner shell. Applicants recognize this problem, as indicated on pages 2 and 3 of the specification, and respond to the problem with the present invention.

More particularly, the present invention includes a disk-shaped inlet end chamber with a plurality of flow control inlet channels, wherein each of the flow control inlet channels becomes progressively wider along a plane which includes the circumference of the inlet end chamber such that each inlet channel has a wider end approaching the annulus, and a narrower end approaching the journal. As explained on pages 5 and 12 of the present specification, these closely spaced inlet channels which become progressively wider along the plane including the circumference of the inlet end chamber, substantially reduce the angular and spiral flow of fluid within the disk-shaped inlet end chamber while providing a substantially uniform and even distribution of fluid flow to the annulus. The progressively increasing inlet channel width is accomplished via a wall between adjacent inlet channels having a substantially uniform thickness, which necessarily leads to uniformity in distance between adjacent inlet channels.

The Wiemer patent teaches away from a disk-shaped end chamber housing closely spaced, progressive width-varying channels. Fig. 2 suggests that each radially extending passage has a uniform width along the plane including the circumference of the corresponding end plate and is separated from adjacent passages by a wall which becomes progressively wider along the length thereof. The uniform widths along the plane including the circumference of the end plate and the increased

distances between the passages at their respective outer ends, contradict the teachings in the present invention.

Applicants urge that the above Amendment and remarks overcome the rejection of Claims 1, 8 and 20 under 35 U.S.C. §102(b) as being anticipated by the Wiemer patent. Thus, Applicants respectfully request withdrawal of this rejection.

Claim Rejections - 35 U.S.C. §103

The rejection of Claims 2, 3, 10-12, 14-18 and 21-25 under 35 U.S.C. §103 as being unpatentable over Wiemer in view of Richards, U.S. Patent 3,135,319, is respectfully traversed.

Claims 2, 3, 10, 11 and 12 ultimately depend from and further limit amended independent Claim 1, which Applicants believe is patentable for the reasons presented above. Claims 21, 22, 23, 24 and 25 ultimately depend from and further limit amended independent Claim 20, which Applicants believe is patentable for the reasons presented above.

Applicants have amended independent Claim 14 to indicate that each inlet channel and each outlet channel becomes progressively wider along a plane including the circumference of the corresponding end chamber.

The Wiemer patent, as discussed above, and/or the Richards patent, alone or in combination, do not teach or suggest the claimed end chamber having

channels of progressively increasing width along a plane including the circumference of the corresponding end chamber.

The Richards patent teaches away from an end chamber housing closely spaced channels which become progressively wider along a plane including the circumference of the end chamber. The Richards patent teaches two separate groups of radial passages, each radial passage of each group communicating with a passage that extends longitudinally within the body of the leveling roll between the ends thereof. Fig. 2 and the specification at Col. 3, line 73 - Col. 4, line 13 suggest that each radial passage has a uniform width along its length and is spaced at a larger distance from each adjacent radial passage at the outer end of the passage, than at the inner end. The uniform widths of the radial passages and the increased distances between the passages at their respective outer ends, contradict the teachings in the present invention. Thus, Applicants believe that independent Claim 14, as well as dependent Claims 15-18 are patentable over the Wiemer patent in view of the Richards patent.

Applicants urge that the above amendment and remarks overcome the rejection of claims 2, 3, 10-12, 14-18, and 21-25 under 35 U.S.C. §103 as being unpatentable over the Wiemer patent in view of the Richards patent.

The rejection of Claims 5-7 under 35 U.S.C. §103 as being unpatentable over Wiemer is respectfully traversed. Claims 5-7 depend from amended independent Claim 1, which is patentable for the reasons presented above.

Claims 5-7 recite 10, 20 and 30 inlet channels in the embodiment of Claim 1, from which they depend. As set forth above, contrary to the Examiner's assertion, the Wiemer patent does not suggest important claimed features of the present invention regardless of the claimed number of inlet channels. Further, as explained on page 13, line 9-15, of the present specification, the number of inlet channels is important because if there are too few in number, then angular flow of fluid within individual inlet channels may occur to an undesirable degree. A comparison of the number of passages in the Wiemer patent to the Applicants' claimed number of inlet channels is illogical because the two inventions are completely different. As explained above, the passages in the Wiemer patent each has a uniform width along the plane including the circumference of the end plate and adjacent passages are spaced apart and separated by a wall having a non-uniform thickness, whereas Applicants' inlet channels are divisions of a disk-shaped inlet end chamber. Thus, Applicants respectfully request withdrawal of this rejection.

The rejection of Claim 4 under 35 U.S.C. §103 as being unpatentable over Wiemer in view of Smith, Jr., U.S. Patent 3,135,319, is respectfully traversed.

Claim 4 depends from amended independent Claim 1, which is patentable for the reasons presented above.

The Wiemer patent and/or the Smith, Jr. patent, alone or in combination, do not teach or suggest the claimed inlet end chamber with inlet channels of progressively increasing width along the plane including the circumference of the inlet end chamber. The Smith, Jr. patent is directed to a heat exchange apparatus that employs “partitions” and “flow diverters” to create “labyrinthine flow channels” between inner and outer cylindrical shells of a rotatable drum drier. The Smith, Jr. patent does not teach or suggest using baffles or partitions to separate the “branch supply passages” at either end of the rotatable drum drier. Instead, the branch supply passages are “drilled or otherwise formed in drier head at uniformly spaced intervals” (Col. 5, lines 35-37). Fig. 5 shows eight outlet ends of branch passages (78 and 88) wherein the outlet ends are very small and considerably far apart from one another. Furthermore, the outlet ends are round, which does not suggest using baffles to create the passages.

The Smith, Jr. patent utilizes branch passages similar to the radial passages of the Wiemer patent. The Smith, Jr. patent does not teach or suggest to a person skilled in the art incorporating the “baffles” of the Smith, Jr. patent labyrinthine flow channels with the radial passages of the Wiemer patent. Further, a combination of the baffles of the Smith, Jr. patent with the radial passages of the

Wiemer patent would still result in radial passages of uniform width along the plane including the circumference of the end plate (rather than progressive varying width) with increasing distance between adjacent passages near the outer cylinder. Thus, Applicants request withdrawal of the rejection of Claim 4 under 35 U.S.C. §103.

The rejection of Claims 9 and 19 under 35 U.S.C. §103 as being unpatentable over Wiemer in view of Richards as applied to claims 2, 3, 10-12, 14-18 and 21-25 above, and further in view of Smith, Jr. is respectfully traversed. Claim 9 depends from amended independent Claim 1, which is patentable for the reasons presented above. Claim 19 depends from amended independent Claim 14, which is patentable for the reasons presented above.

As discussed above, the Wiemer patent and/or the Richards patent, alone or in combination, do not teach or suggest the claimed end chamber having channels of progressively increasing width along the plane including the circumference of the end chamber. Further, as discussed above, a person skilled in the art would not incorporate the “baffles” of the Smith, Jr. patent labyrinthine flow channels with the radial passages of the Wiemer patent as modified by the Richards patent. Thus, Applicants request withdrawal of the rejection of Claims 9 and 19 under 35 U.S.C. §103.

The rejection of Claim 13 under 35 U.S.C. §103 as being unpatentable over Wiemer in view of Eriksen et al., U.S. Patent 5,590,704, is respectfully traversed.

Claim 13 depends from amended independent Claim 1, which is patentable for the reasons presented above.

The Eriksen et al. patent teaches a bent sheet with profiles in a helical pattern, such that fluid can flow through the ducts below the profiles and above the sheet through the annulus. It would not have been obvious at the time this invention was made to a person having ordinary skill in the art to employ in the Wiemer patent a spiral fluid flow channel for the purpose of reducing flow resistance as disclosed in the Eriksen et al. patent. Further, the two-way flow mechanism in the Eriksen et al. patent would not be a logical combination with the Wiemer patent to create the present invention, mainly because a combination of the teachings of the Eriksen et al. patent with the Wiemer patent would result in a two-way flow mechanism wherein the fluid flows through spaced apart tubes of uniform width. In contrast, the present invention is geared toward a one-way flow mechanism, one embodiment of which utilizes a spiral flow pattern to help maximize heat transfer by facilitating an even and high degree of fluid fill, and high fluid velocity within the annulus, as explained on page 14 of the present specification. Thus, Applicants request withdrawal of this rejection.

Conclusion

Applicants sincerely believe that this patent application is now in condition for allowance and, thus, respectfully request early allowance.

Respectfully submitted,



Eric T. Krischke
Reg. No. 42,769

Pauley Petersen Kinne & Fejer
2800 West Higgins Road
Suite 365
Hoffman Estates, Illinois 60195
(847) 490-1400
FAX (847) 490-1403